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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
CARTER, AARON W	

ART UNIT	PAPER NUMBER
2624	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	**Application No.** 09/553,140	**Applicant(s)** BERMAN, MICHAEL J.	
	Examiner AARON W. CARTER	**Art Unit** 2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 July 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-28* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-28* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *20 April 2000* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 7/27/09 has been entered.

Response to Arguments

2. Applicant's arguments with respect to claims 1, 9, 15 and 23 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 2, 12, 16 and 26 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

5. In claims 2, 12, 16 and 26, the language "utilizing a high speed camera" in line 4 does not particularly point out and distinctly claim the invention because it is unclear what the metes and bounds of a "high speed camera" is from Appellant' s Specification. *SeattleBox Co. v. Industrial Crating & Packing, Inc.,* 731 F.2d 818, 826, 221 USPQ 568, 574 (Fed. Cir. 1984) ("When a word of degree is used the district court must determine whether the patent's specification provides some standard for measuring said degree. The trial court must decide, that is, whether one of ordinary skill in the art would understand what is claimed when the claim is read in light of the specification."). No express definitions of a "high speed camera" to differentiate the claim limitations from the prior art are found. Claims 12, 16 and 26 recite similar limitations to that of claim 2 and therefore the Examiner is unable to determine the metes and bounds of each of claims 2, 12, 16 and 26. As a result, the Examiner cannot effectively apply prior art thereto, however the Examiner will attempt to apply prior art to the best of their ability below.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 1, 2, 5-9, 12-16, 19-23, and 26-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over USPN 5,640,242 to O’Boyle et al. (“O’Boyle”) (already of record) in view of USPN 6,186,877 to Lofaro.

As to claim 1, O'Boyle discloses a method of determining layer thickness of a particular area of a substrate during CMP of the substrate, the method comprising:

acquiring an image of a particular area of the substrate while the substrate (*column 4, lines 12-21*);

comparing the acquired image to each one of a plurality of stored patterns (*column 3, lines 23-30*) and ; and

converting the acquired image into a layer thickness measurement when the acquired image corresponds to one of said plurality of stored patterns (*column 3, lines 23-30*).

O'Boyle does not disclose expressly that the plurality of stored patterns are a plurality of stored ***image*** patterns, however it is obvious to one of ordinary skill in the art that the acquired image is compared to reference images. Furthermore, O'Boyle does not disclose expressly the limitation of acquiring the image of the substrate while the substrate is moving at a speed of at least 200 lineal feet per minute.

However, Lofaro discloses a method of analyzing a substrate during CMP of the substrate the method comprising:

acquiring an image of a particular area of the substrate while the substrate is moving at a speed of at least 200 lineal feet per minute (*column 4, lines 33-36 and column 6, lines 46-53, wherein thousands of revolutions per minute translate to at least 200 lineal feet per minute*).

using the image to provide in situ endpoint detection while the wafer is engaged or even during polishing (*column 4, lines 30-44*).

O'Boyle & Lofaro are combinable because they are from the same art of image processing and specifically imaging during a CMP of a substrate.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to combine the image acquisition of a substrate while the substrate is moving at a speed of at least 200 lineal feet per minute, as taught by Lofaro with the method of determining layer thickness of a particular area of a substrate during CMP of the substrate as disclosed by O'Boyle.

The suggestion/motivation for doing so would have been to provide in situ endpoint detection while the wafer is engaged in a wafer carrier or even during polishing (*Lofaro, column 4, lines 33-36*).

Therefore, it would have been obvious to combine O'Boyle with Lofaro to obtain the invention as specified in claim 1.

As to claim 2, the combination of O'Boyle and Lofaro discloses the method of claim 1, wherein acquiring an image of a particular area of the substrate includes:

Projecting a conventional light source onto the substrate (*Lofaro, column 4, lines 30-44 and O'Boyle, column 3, lines 17-21*); and

Utilizing a high speed camera (*Lofaro, column 4, lines 30-44 and O'Boyle, column 3, lines 11-16*).

As to claim 5, the combination of O'Boyle and Lofaro discloses the method of claim 1, wherein acquiring an image of a particular area of the substrate includes:

Delivering a pulse of light from a broadband light source onto the particular area of the substrate (*Lofaro, column 4, lines 30-44 and O'Boyle, column 3, lines 17-21*); and

Utilizing a conventional camera (*Lofaro, column 4, lines 30-44 and O'Boyle, column 3, lines 11-16*).

As to claim 6, the combination of O'Boyle and Lofaro discloses the method of claim 5, wherein said broad band light source comprises a flash lamp (*Lofaro, column 4, lines 30-44 and O'Boyle, column 3, lines 17-21*).

As to claim 7, the combination of O'Boyle and Lofaro discloses the method of claim 1, wherein converting the acquired image into a layer thickness measurement includes converting pixels of the acquired image into a layer thickness (*O'Boyle, column 3, lines 23-30, wherein pixels of the captured image are compared to a reference set to output a thickness measurement corresponds to converting pixels of the image into a layer thickness*).

As to claim 8, the combination of O'Boyle and Lofaro discloses the method of claim 1, wherein said determination of layer thickness of the substrate is performed in situ (*O'Boyle, column 5, lines 7-18*).

As to claim 9, please refer to the rejection of claim 1 above.

As to claim 12, please refer to the rejection of claim 2 above.

As to claim 13, please refer to the rejection of claim 5 above.

As to claim 14, please refer to the rejection of claim 6 above.

As to claim 15, please refer to the rejection of claim 1 above.

As to claim 16, please refer to the rejection of claim 2 above.

As to claim 19, please refer to the rejection of claim 5 above.

As to claim 20, please refer to the rejection of claim 6 above.

As to claim 21, please refer to the rejection of claim 7 above.

As to claim 22, please refer to the rejection of claim 8 above.

As to claim 23, please refer to the rejection of claim 1 above.

As to claim 26, please refer to the rejection of claim 2 above.

As to claim 27, please refer to the rejection of claim 5 above.

As to claim 28, please refer to the rejection of claim 6 above.

8. Claims 3, 4, 10, 11, 17, 18, 24 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over O'Boyle and Lofaro in view of USPN 5,667,424 to Pan (already of record).

As to claim 3, the combination of O'Boyle and Lofaro discloses the method of claim 1, wherein acquiring an image of a particular area of the substrate includes:

Delivering a pulse of light from a light source onto the particular area of the substrate (*Lofaro, column 4, lines 30-44 and O'Boyle, column 3, lines 17-21*); and

Utilizing a conventional camera (*Lofaro, column 4, lines 30-44 and O'Boyle, column 3, lines 11-16*).

The combination of O'Boyle and Lofaro does not disclose expressly delivering a pulse of light from a ***coherent*** light source onto the particular area of the substrate.

However, Pan discloses a method of analyzing a substrate during CMP of the substrate the method comprising:

acquiring an image of a particular area of the substrate while the substrate that is moving (*column 3, lines 51-59*); and

using the image to provide endpoint detection (*column 4, lines 23-33*)

wherein acquiring an image of a particular area of the substrate includes:

delivering a pulse of light from a coherent light source onto the particular area of the substrate (*column 3, lines 45-50*); and

utilizing a conventional camera (*column 3, lines 51-59*).

O'Boyle, Lofaro & Pan are combinable because they are from the same art of image processing and specifically imaging during a CMP of a substrate.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to employ the coherent light source, as taught by Pan, with the method of determining layer thickness of a particular area of a substrate during CMP of the substrate as disclosed by the combination of O'Boyle and Lofaro.

The suggestion/motivation for doing so would have been to provide sufficient light to be detected by the sensor but not so intense as to cause damage to the sensor (*Pan, column 3, lines 45-50*).

Therefore, it would have been obvious to combine O'Boyle and Lofaro with Pan to obtain the invention as specified in claim 3.

As to claim 4, the combination of O'Boyle, Lofaro and Pan discloses the method of claim 3, wherein said coherent light source comprises a laser (*Pan, column 3, lines 45-50*).

As to claim 10, please refer to the rejection of claim 3 above.

As to claim 11, please refer to the rejection of claim 4 above.

As to claim 17, please refer to the rejection of claim 3 above.

As to claim 18, please refer to the rejection of claim 4 above.

As to claim 24, please refer to the rejection of claim 3 above.

As to claim 25, please refer to the rejection of claim 4 above.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

USPN 7,018,271 and 6,159,073 to Wiswesser et al. discloses film thickness measuring during CMP of a substrate.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to AARON W. CARTER whose telephone number is (571)272-7445. The examiner can normally be reached on 9am - 5:30 pm (Mon. - Fri.).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian Werner can be reached on (571) 272-7401. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Aaron W Carter/
Primary Examiner, Art Unit 2624